United States Environmental Protection Agency

Public Water System Historical Significant Non-Compliers:

National Trends Report

Office of Water (4606 M)
EPA 816-R-10-015
October 2010
water.epa.gov/drink/

Table of Contents

List of Exhibits

List of Tables

Introduction

What does this report summarize?

Capacity Development provisions under the Safe Drinking Water Act (SDWA), Section 1420(b)(1), require that each state periodically submit to EPA a list of community water systems (CWSs) and nontransient noncommunity water systems (NTNCWSs) with a history of significant non-compliance. The states and EPA concurred that a public water system is a historical significant non-complier (HSNC) when it has violations that meet the definition of a significant non complier (SNC) as defined for a specific regulation for the duration of at least 3 quarters during a 3-year period.[1] This report summarizes over 10 years of HSNC trends nationwide in 4 time periods: 1997 – 1999, 2000 – 2002, 2003 – 2005 and 2006 – 2008.[2]

What is the goal of identifying HSNCs and this report?

The central purpose of generating HSNC lists is to help states identify the CWSs and NTNCWSs that consistently struggling to comply with drinking water regulations. This lack of compliance can often be linked to inadequate technical, managerial, or financial (TMF) capacity that can impede long-term sustainability. States often use HSNC lists to prioritize technical assistance and Drinking Water State Revolving Fund (DWSRF) resources. This report not only summarizes the characteristics of the HSNC lists but also attempts to identify challenges that might impede system capacity, and presents examples of how some states have addressed these challenges. EPA's goal is to work with states to develop the tools to identify systems without capacity, prioritize capital improvements, and apply funds from the DWSRF in the most efficient matter.

How did EPA collect this information?

EPA generated the preliminary HSNC list from a Safe Drinking Water Information System (SDWIS) query program developed by the Office of Enforcement and Compliance Assurance. This HSNC list was shared with EPA Regions and states for their review and comment during the summer of 2009. The updated data were then used to generate this report.

EPA faced some data limitations in analyzing the HSNC data. Specifically, the data analysis presented in this report is limited due to the following:

- HSNCs are treated equally regardless of the severity of the violation, rule violated, or the type of violation.
- Challenges in pinpointing the reason for a system's non-compliance.
- Lack of a standardized process used by states to achieve a system's return to compliance for different types of violations.
- Inconsistent compliance data quality.

1 Heare, Stephen F. 2009. Memorandum to Drinking Water Program Managers, Regions 1-10, Drinking Water Enforcement Coordinators, Regions 1-10, and Drinking Water State Revolving Fund Managers, Regions 1-10, regarding the 2009 List of Systems with a History of Significant Non-Compliance. May 4, 2009. A SNC is a system whose serious, frequent, or persistent non-compliance of drinking water regulations has met the SNC criteria as defined by the EPA for a specific rule. The SNC designation is reserved for those systems that are considered to pose the most serious threats to public health.

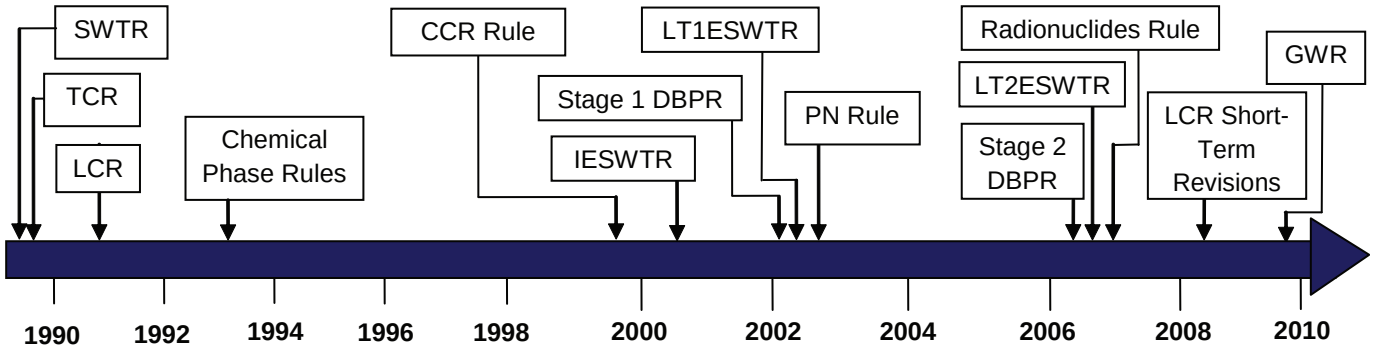
2 All states submitted data (with some missing components) for 1997 – 1999, 2003 – 2005, and 2006 – 2008. The following programs did not submit data for 2000 – 2002: ME, NJ, NM, NY, and RI.

EPA is aware of the limitations of the current HSNC structure and is transitioning toward a more comprehensive enforcement approach. For more information on this new approach, please refer to Appendix A: "Changes to PWSS Program Approach."

Exhibit 1 shows the implementation timeline for various drinking water rules discussed in this report. As the HSNC data in this report indicate, the initial implementation of rules often coincides with an increase in violations as systems adapt to the new requirements. For example, as the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR), Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), and Ground Water Rule (GWR) enter their initial compliance phase during upcoming years, violations associated with these rules will likely increase.

Exhibit 1: Timeline of Rule Implementation[3]

Please see Table 1 in Appendix B for a list of acronyms and their definitions.



HSNC Trends by System Size & Type

For the purpose of this report, system sizes are defined as small, medium and large. Small systems serve 3,300 and fewer people, medium systems serve between 3,301 and 50,000 people, and large systems serve more than 50,000 people. Also for this report, a system type is classified as either a CWS or a NTNCWS. A CWS is a public water system that supplies water to the same population year-round. A NTNCWS is a public water system that is not a CWS and regularly supplies water to at least 25 of the same people at least 6 months per year, but not necessarily year-round. Some examples of NTNCWSs are schools, factories, office buildings, and hospitals that have their own water systems.[4] For additional definitions of terms used in this report, see Appendix B.

In this report, we examine HSNC trends for all sizes of CWSs and NTNCWSs, by rule and violation. As shown in Exhibit 2, although less than 10 percent of CWSs and NTNCWSs are HSNCs, there are still a fairly significant number of small systems that are identified as HSNCs.

3 Stage 1 DBPR had compliance deadlines of January 2002 for medium and large systems, January 2004 for small systems, and additional monitoring requirements in 2009. For Stage 2 DBPR, depending on system size and the extent of needed construction, systems will begin the first year of compliance monitoring between 2012 and 2016 and must be in compliance with the Stage 2 DBPR MCLs at the end of a full year of monitoring.

4 Public water system means a system for the provision to the public of water for human consumption through pipes or, after August 5, 1998, other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Source: EPA. 2009. Code of Federal Regulations. Part 141-National Primary Drinking Water Regulations. Section 141.2 Definitions.

- Approximately 8 percent of the total universe of CWSs (or 4,209 out of 51,988 systems) were HSNCs during the period 2006 – 2008 (see Exhibit 2). Compared to previous years, this represents a slight decrease in the number of HSNCs for this group (9 percent, or 4,929 of the 52,349 CWSs, were HSNCs during the 2003 – 2005 period).[5]

- Approximately 5 percent of the total universe of NTNCWSs (or 955 out of 18,742 systems) were HSNCs during the period of 2006 – 2008 (See Exhibit 2). The same percentage of NTNCWSs were HSNCs during the 2003 – 2005 period.

Exhibit 2: Total Number of Current Public Water Systems and HSNCs[6,7]

	Small	Medium	Large	Total
CWSs	43,018	8,031	939	51,988
CWS HSNCs	3,627 (8%)	538 (7%)	44 (5%)	4,209 (8%)
NTNCWSs	18,595	145	2	18,742
NTNCWS HSNCs	951 (5%)	4 (3%)	0 (0%)	955 (5%)

- Approximately 3 percent, or 138 of the 5,142 HSNCs, have been HSNCs continuously since 1997 (94 percent, or 129 of 138 water systems, are CWSs).[7]

- Approximately 7 percent, or 348 the 5,142 HSNCs, have been HSNCs continuously since 2000 (91 percent, or 317 of the 348 systems, are CWSs). Approximately 28 percent, or 1,452 of the 5,142 HSNCs, have been HSNCs continuously since the 2003 – 2005 time period (88 percent, or 1,291 of the 1,452 systems, are CWSs).[7]

- The rules and violations affecting these systems can vary over the different time periods and the CWSs and NTNCWSs are not always HSNCs over multiple time periods for the same reason.

- The most common reason for a system to be an HSNC is lack of short-term technical, managerial, or financial capacity, which is cited for approximately 50 percent of the HSNCs.

- NTNCWSs are designated less frequently as HSNCs, when proportionally compared to CWSs. This is not only true in the 2006 – 2008 data, but also in the previous three time periods. One possible explanation is that NTNCWSs face fewer drinking water requirements than CWSs. The HSNCs reported were widely dispersed across the country and included both surface water and ground water systems. With the GWR coming into effect in 2009, public water systems that use ground water sources could face an increased number of violations, particularly those small systems that lack the technical,

5 In the period 2003 – 2005, there were 52,349 CWSs, of which 4,929 were CWS HSNCs. In the period 2006 – 2008, there were 51,988 CWSs (a drop perhaps due to small system consolidation) and 4,209 CWS HSNCs.

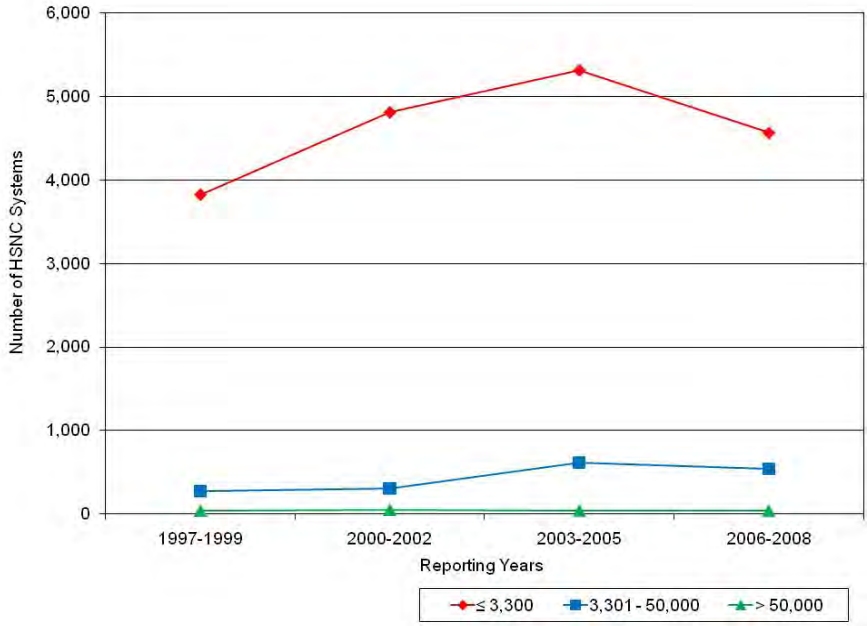
6 Total number of current water systems based on EPA SDWIS FY08Q3 frozen inventory table; total number of HSNCs based on HSNC survey data for 2006 – 2008.

7 Twenty-two water systems changed either their water system type or size category in the 2006 – 2008 reporting period, and are therefore counted twice. Seven of these systems changed their size category, 14 systems changed system type, and 1 system changed size and type. These systems are not counted twice in Exhibit 4 because it is a state-by-state total and does not include a size or type classification. Only 3 of the 22 systems were repeat HSNCs. These systems were HSNCs continuously since the 2003 – 2005 time period. Of the 3 repeat HSNCs, 2 changed system type and 1 changed size. For the purposes of this analysis, these systems were counted as CWSs.

managerial, and financial capacity to fully comply with new rules. The GWR will require quick turnaround compliance activities and public notifications that some small systems may find challenging initially as they learn the rule requirements.

- The number of large system HSNCs has remained consistently low across all four time periods (see Exhibit 3). This seems to indicate that large systems are able to adapt to rule requirements at a faster rate than the smaller systems.
- As shown in Exhibit 3, the number of medium system HSNCs remained relatively constant during the first two time periods, but jumped after the 2000 – 2002 period. This increase may be attributed to the multiple Microbials and Disinfection Byproducts (M/DBP) Rules that were implemented during this time, as shown in Exhibit 1.
- All four time periods of data appear to support the fact that small systems are still more likely to be on the HSNC list than medium or large systems. Between the 1997 – 1999 and 2003 – 2005 timeframes, the number of small system HSNCs increased approximately 10 to 15 percent per 3-year period. However, after the 2003 – 2005 period, the number of small system HSNCs began to decrease (see Exhibit 3). The data indicate that small systems continue to face challenges with regulatory compliance.

Exhibit 3: HSNCs by System Size, Over 4 HSNC Periods[8]



- A 2006 report from EPA's Inspector General identified eight challenges small systems face that may impede regulatory compliance.[9] The eight challenges listed below are possible reasons why the data indicate that small systems incur violations at a higher rate than the medium and large systems.

1. Lack of financial resources.
2. Aging infrastructure.
3. Difficulties obtaining financial assistance.

8 The 8 water systems that changed size categories are double counted in this exhibit. See Footnote 7 for more details.

9 EPA Office of Inspector General. 2006. "Much Effort and Resources Needed to Help Small Drinking Water Systems Overcome Challenges." May 30, 2006. Report No. 2006-P-00026.

4. Cost of scale.
5. Management limitations.
6. Lack of long-term planning.
7. System operator issues.
8. Challenges with understanding and/or complying with regulations.

- These eight challenges can broadly be categorized as technical, managerial, and financial capacity issues which affect the ability of small water systems to achieve and maintain system sustainability to provide safe drinking water. It is important to note that not all small systems lack capacity; however, the data show many of them struggle with compliance.

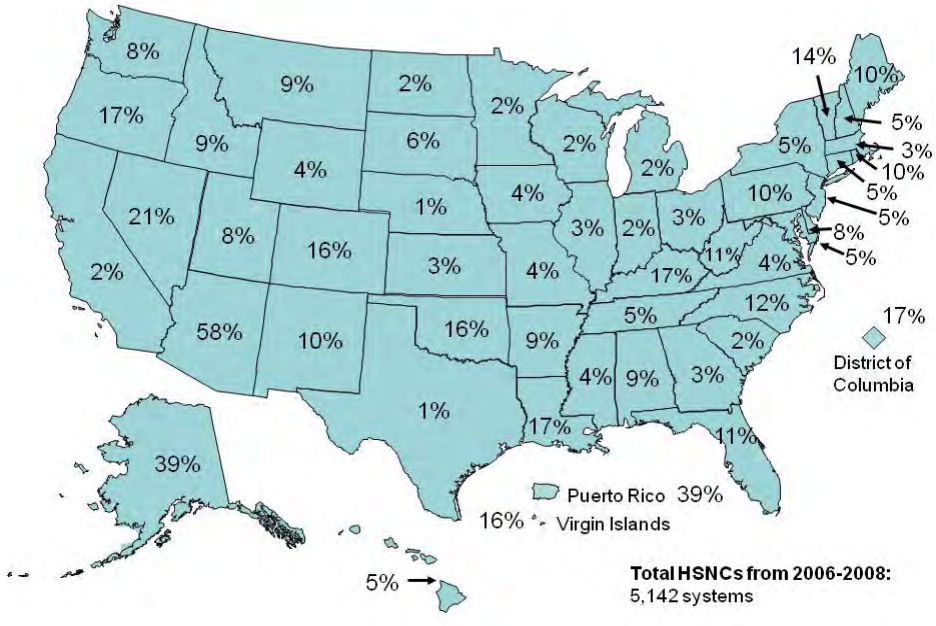
- The data also indicate that the number of systems that are HSNCs due to lacking a qualified operator has increased since 2004. A certified and experienced operator is vital to the health of the public water system. Not having a certified or appropriately trained operator can lead to compliance problems that can in turn contribue to financial challenges.

- The data also indicate that states are aware that many of the HSNC systems lack adequate capacity. According to recent EPA analyses of the use of DWSRF set-asides, 48 states are using set-aside funds to implement or manage a capacity development strategy. States use DWSRF set-asides to fund a number of specific efforts tied to capacity development, including on-site assistance, small system trainings, sanitary surveys, data management, and upfront planning. The HSNC list may serve as a tool for states to identify and target technical assistance to the systems most in need.

- Exhibit 4 displays the percentage of systems that were HSNCs in the 2006 – 2008 time period, by state and territory. As shown, Arizona had the highest percentage of HSNC systems, followed by Alaska and Puerto Rico.

Exhibit 4: Percentage of Systems that are HSNCs, 2006 – 2008

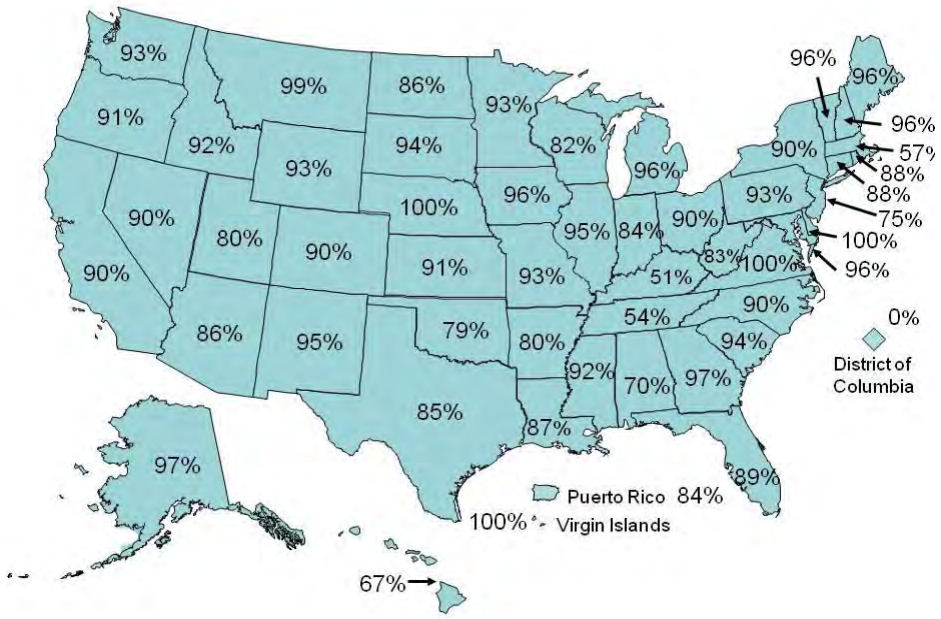
Please see Appendix C for the number of systems by state.



- Exhibit 5 shows that in a majority of the states, small systems comprised over 90 percent of HSNCs in the 2006 – 2008 period. In Virginia and the Virgin Islands, 100 percent of HSNCs were small systems.

Exhibit 5: Percentage of HSNCs that are Small Systems, 2006 – 2008

Please see Appendix C for the number of systems by state.



How the State of Georgia Uses the HSNC List to Increase the Number of Sustainable Systems in their Inventory

The State of Georgia has successfully utilized the SNC list to target their assistance to systems in need. In Georgia, very small systems (those serving fewer than 500 people) represent 74 percent of all public water systems in the state. However, these systems accounted for 88 percent of the state's SNCs between July 1, 2007 and June 30, 2008. This disproportionate percentage of very small systems that were designated as SNCs prompted the Georgia Environmental Protection Division (EPD) to increase their assistance to small public water systems in developing their technical, managerial, and financial capacity. This effort has produced positive results, as Georgia has seen a decline in the number of SNCs (HSNCs in Georgia dropped by approximately 51 percent, or 77 systems, from the period 2003 – 2005 to the period 2006 – 2008).

HSNC Trends by Rule & Violation

To better understand HSNCs it is important to look at the regulations and violations that have triggered systems onto the HSNC list, as well as the system's size and type. In this section we explore the regulations and the violations that most often triggered systems onto the HSNC list across the nation.

Microbials and Disinfection Byproducts (M/DBP) Rules

This section discusses the systems that achieved an HSNC listing due to the M/DBP Rules. This group of rules includes the following:

- ✓ Total Coliform Rule (TCR)
- ✓ Surface Water Treatment Rule (SWTR)
- ✓ Interim Enhanced Surface Water Treatment Rule (IESWTR)
- ✓ Long Term 1 Enhanced Surface Water Treatment Rule (LT1/LT1ESWTR)
- ✓ Stage 1 Disinfectants and Disinfection Byproducts Rule (DBPR/Stage 1 DBPR)
- ✓ Filter Backwash Recycling Rule (FBRR)
- ✓ *Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR)**
- ✓ *Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)**
- ✓ *Ground Water Rule (GWR)**

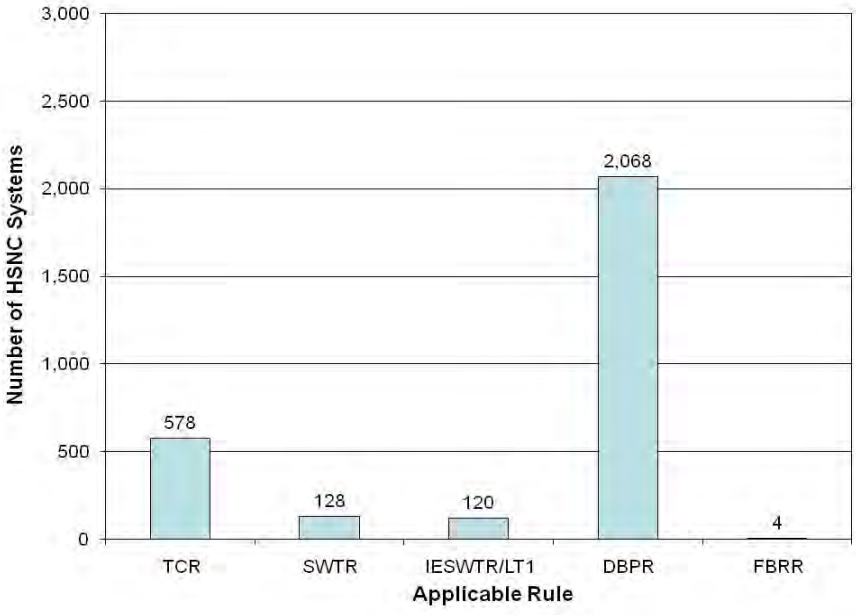
** The compliance dates of these regulations occur after 2008.*

- Based on the 2006 – 2008 data, the most common HSNCs under the M/DBP Rules occurred under the Stage 1 DBPR (see Exhibit 6). However, Stage 1 DBPR violations declined in comparison to the 2,555 violations from the 2003 – 2005 period. Stage 1 compliance deadlines passed in January 2002 for medium and large systems and in January 2004 for small systems.[10]

- Although a drop in violations between timeframes occurred, there still continues to be a large number of HSNCs during 2006 – 2008 due to violations of the Stage 1 DBPR, both for M&R and MCL violations.[11] As noted above, compliance with Stage 1 DBPR requirements for systems serving fewer than 10,000 persons

Exhibit 6: HSNCs by M/DBP Rule, 2006 – 2008

Please see Appendix B for an explanation of applicable rules.



10 New monitoring will be required for Stage 1 DBPR in 2009 and Stage 2 DBPR starting in 2012, likely leading to additional violations.

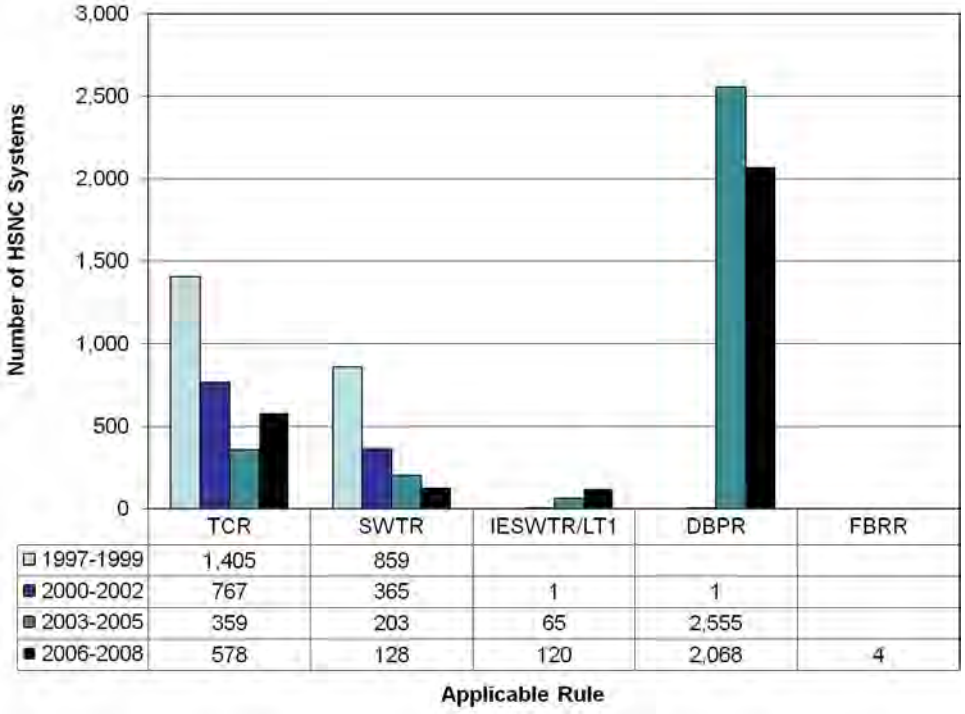
11 Some systems incurred more than one violation type under one or more rules.

started in January 2004. The large volume of violations could be due to systems serving fewer than 10,000 persons still adapting to compliance requirements.

- For TCR, the increase in M&R violations in the 2006 – 2008 period was more than twice that of non-M&R violations, indicating that systems are still having difficulty meeting the TCR monitoring and reporting requirements. TCR is the oldest drinking water regulation, so lack of knowledge of the rule requirements cannot be the only reason for this lack of compliance. The universe of systems that have the most violations under this rule serve 3,300 and fewer people. EPA hosted the Total Coliform Rule Distribution System Advisory Committee (TCRDSAC) in 2008, where national experts representing states, water industry, water systems, and other vested organizations discussed why small systems have challenges complying with the TCR. The most common reason identified by the group was the lack of apparent consequences for rule violations. For example, if a system is on reduced monitoring and they receive a monitoring violation, the rule allows them to remain on reduced monitoring.
- The high turnover rate among water system managers and operators also contributes to the lack of understanding of the TCR, despite the rule's age. This lack of experience, and thus knowledge of drinking water regulations, can dramatically inhibit the technical and managerial capacity of a system, leading to increased numbers of M&R violations.
- As shown in Exhibit 7, there was an 85 percent increase in IESWTR/LT1 HSNCs (driven primarily by small systems, which jumped from 45 HSNCs in 2003 – 2005 to 95 HSNCs in 2006 – 2008). This coincides with the LT1 regulatory compliance date, which applies to systems serving fewer than 10,000 persons. Although the rule was promulgated in 2002, many of the LT1 requirements did not take effect until 2005.
- On the other hand, there was a moderate decline in SWTR HSNCs across all time periods (Exhibit 7). This could be due to the fact that the newer rule requirements superseded the SWTR.

Exhibit 7: HSNCs by M/DBP Rule, Over 4 HSNC Periods

Please see Appendix B for an explanation of applicable rules.



	TCR	SWTR	IESWTR/LT1	DBPR	FBRR
1997-1999	1,405	859			
2000-2002	767	365	1	1	
2003-2005	359	203	65	2,555	
2006-2008	578	128	120	2,068	4

Chem/Rad Rules and Lead and Copper Rule

This section discusses the systems that achieved an HSNC listing due to the following rules:

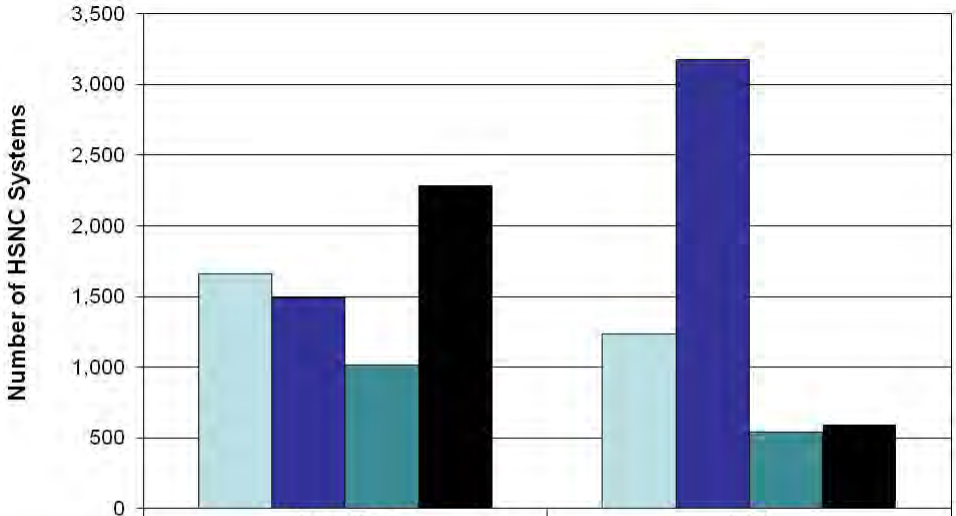
- ✓ Phase II/V Rule
- ✓ Arsenic Rule
- ✓ Radionuclides Rule
- ✓ Lead and Copper Rule (LCR)

For the purposes of this report, the Radionuclides Rule, the Arsenic Rule, and the Phase II/V Rule are grouped together as "Chem/Rad Rules."

- As shown in Exhibit 8, LCR HSNCs increased by approximately 10 percent (or 56 systems) from the 2003 – 2005 period to the 2006 – 2008 period. However, the largest increase was in 2000 – 2002. Significant attention was paid to the LCR after high lead levels were reported in the Washington, DC area in 2004.[12] This heightened attention caused EPA and states to conduct a national review of implementation of the LCR to determine if there was a national problem related to elevated lead levels. The review placed a focus on determining if the rule was being effectively implemented by states and local communities and on identifying where additional guidance or changes to the regulation were needed to improve implementation. Congress also held a number of oversight hearings to further investigate implementation of the LCR in the District of Columbia and the nation. This wide-ranging review of the LCR likely led to an increased number of reported violations. Under this effort, EPA developed short term rule revisions to help in the implementation of the regulation. However, as with all of the drinking water rules, the LCR violations data likely has some reporting errors; for instance, the violations code for initial tap sampling is still very prevalent even though most systems are not new and in fact conducted their initial tap sampling in the 1990s. There are two reasons why the violation code for initial tap sampling is still prevalent today. First, states are incorrectly assigning an initial

Exhibit 8: HSNCs by Lead and Copper Rule and Chem/Rad Rules, Over 4 HSNC Periods

Please see Appendix B for an explanation of applicable rules.



	Chem/Rad	LCR
1997-1999	1,657	1,238
2000-2002	1,490	3,174
2003-2005	1,014	539
2006-2008	2,290	595

12 Source: 31 January 2004. Washington Post. Nakamura, David. "Water in D.C. Exceeds EPA Lead Limit." Pg.A-1.

tap sampling violation code as an M&R violation and/or assigned the initial tap sampling violation correctly, but did not properly close the violation. Second, states may have assigned the initial tap sampling violation correctly, but the systems did not follow the correct steps to return to compliance.

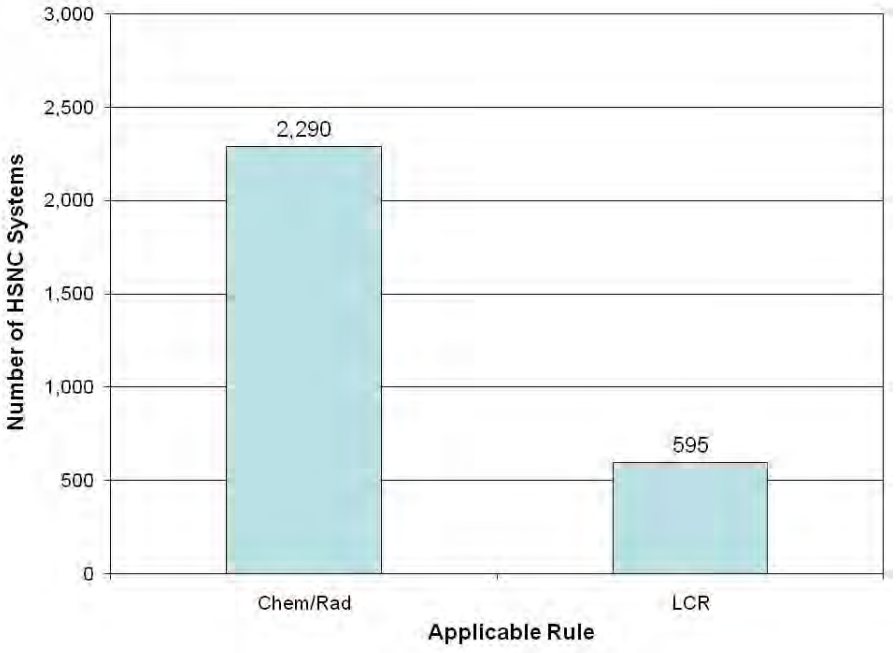
- States have indicated that particularly complex rules can cause water system compliance problems. For instance, water systems often face challenges with the sampling protocol and action level established under the LCR. EPA is currently undertaking an effort to develop long-term rule revisions.

- The 2006 – 2008 data show that there was a significant number of HSNCs under the Chem/Rad Rules (see Exhibit 9). In comparison to the 2003 – 2005 timeframe, the number of HSNCs increased by approximately 125 percent (or 1,276 systems, see Exhibit 8).

- Some Chem/Rad HSNCs during the 2006-2008 period likely resulted from the implementation of the new Arsenic requirements starting in 2006.[13] Water systems faced a number of challenges complying with the Arsenic Rule, including treatment modifications and finding alternative sources of water. The rule tends to significantly affect small systems in particular areas of the country where arsenic levels are high due to the treatment cost.

Exhibit 9: HSNCs by Lead and Copper Rule and Chem/Rad Rules, 2006 – 2008

Please see Appendix B for an explanation of applicable rules.



- Moreover, many water systems neglected to report monitoring results for at least one of the required contaminants under the Radionuclides Rule, particularly gross alpha particle. During the 2006 – 2008 period, approximately 230 systems violated Chem/Rad Rules because of gross alpha particle.

- There are 65 contaminants regulated under the Phase II/V Rules. These 65 contaminants are split up into three groups: Inorganic Chemicals (IOCs), Synthetic Organic Chemicals (SOCs), and Volatile Organic Chemicals (VOCs). The data show a spike in violations every three years. This is likely a result of the 3-year monitoring cycle in the regulation. If

13 EPA set the arsenic standard for drinking water at 0.010 parts per million (10 parts per billion) to protect consumers served by public water systems from the effects of long-term, chronic exposure to arsenic. Water systems had to comply with this standard by January 23, 2006.

a system misses the sampling during the required period, violations are assigned for each contaminant missed.

- Due to the recent number of M/DBP Rules promulgated, states shifted their immediate attention and resources to early implementation of these regulations. Emphasis by states on the LCR and Chem/Rad Rules may have decreased as states' efforts were redirected to Early Implementation, which in turn might have led to an increased number of violations.

> ***How the State of Pennsylvania Increased Monitoring Efforts***
>
> *During the 2006 – 2008 time frame, Pennsylvania actively worked to improve the timeliness of violations reporting. In particular, the state employed a new system to e-mail information on treatment technique violations to state staff nightly, to ensure that the staff promptly act on the violation. This may have led to an increase in violations tied to HSNCs over the previous period.*

Right-to-Know Rules

The rules known as "Right-to-Know Rules" include the Public Notification (PN) Rule and the Consumer Confidence Report (CCR) Rule. Implementation of the CCR Rule began in October 1999. The PN Rule applied to public water systems in states with approved primacy programs in May 2002.

- According to the data, during recent periods there has been a significant decrease in HSNCs related to consumer confidence reports, record keeping, and public notification violations.
- From 2006 – 2008, the CCR Rule continued to challenge many systems. However, CCR HSNCs declined by nearly 52 percent (or 1,104 systems) between the 2003 – 2005 and 2006 – 2008 periods. Additionally, the data show that CCR HSNCs decreased from 576 systems in 2007 to 268 in 2008. This could be due to an increase in the knowledge of the systems in terms of CCR compliance. In the 2003 – 2005 period, the number of HSNCs due to the CCR Rule was high (up to 1,250 HSNCs in 2003). This further supports the trend that there is an increase in violations following the start of implementation of a rule. Although the CCR Rule was promulgated in 1998, the CCR SNC definition was not established until 2003.
- As discussed earlier, implementation of the GWR could lead to increased violations (e.g., public notification) in upcoming years, particularly for small systems.

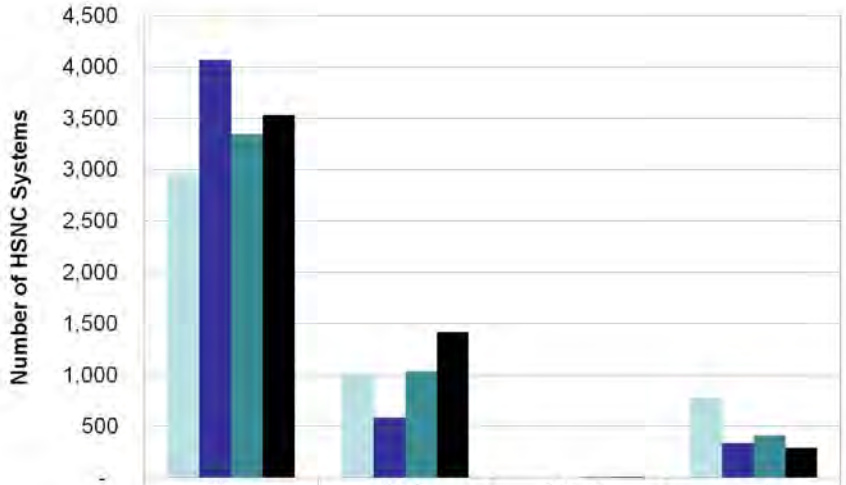
Types of Violations: M&R vs TT vs MCL

The type of violation – monitoring & reporting (M&R), treatment technique (TT), or maximum contaminant level (MCL) – is what identifies systems as HSNCs. Below are several findings regarding the types of violations in the HSNC data.

- As shown in Exhibit 10, failure to correctly monitor and report was the most common reason that systems became HSNCs. The data indicate that M&R HSNCs slightly increased (by approximately 5 percent) in the 2006 – 2008 period. During the 2006 – 2008 period, the rules linked to the majority of the M&R HSNCs were Chem/Rad, Stage 1 DBPR, LCR, and TCR.

Exhibit 10: HSNCs by Violation, Over 4 HSNC Periods

Please see Appendix B for an explanation of violation types.



	M&R	MCL	MRDL	TT
1997-1999	2,947	1,004		773
2000-2002	4,068	587		339
2003-2005	3,348	1,038	2	412
2006-2008	3,530	1,416	4	289

- Exhibit 10 shows that the number of HSNCs due to M&R violations peaked during the 2000 – 2002 period; there were approximately 4,000 HSNCs caused by M&R violations in this period, an increase of approximately 38 percent (or 1,121 systems) over the previous period. In 2003 – 2005, the number of HSNCs caused by M&R violations dropped back down towards the 1997 – 1999 levels. HSNCs due to M&R violations slightly increased again in the 2006 – 2008 period. EPA suspects this increase could be due to the 3-year monitoring cycle required under the Phase II/V rules as explained earlier in the document.

- For some states, a significant number of M&R violations might be tied to a data management change implemented within the 2006 – 2008 period. For example, Oregon moved from using individual data systems to SDWIS/State, which features automated compliance tracking for some rules. This resulted in an increase in violations and HSNCs in Oregon in late 2006.

- For other states, the increase in M&R violations could be due to an increase in the knowledge of implementing these rules. As state staff become more familiar with the drinking water regulations, they are better able to implement the rule requirements and assign violations when appropriate.

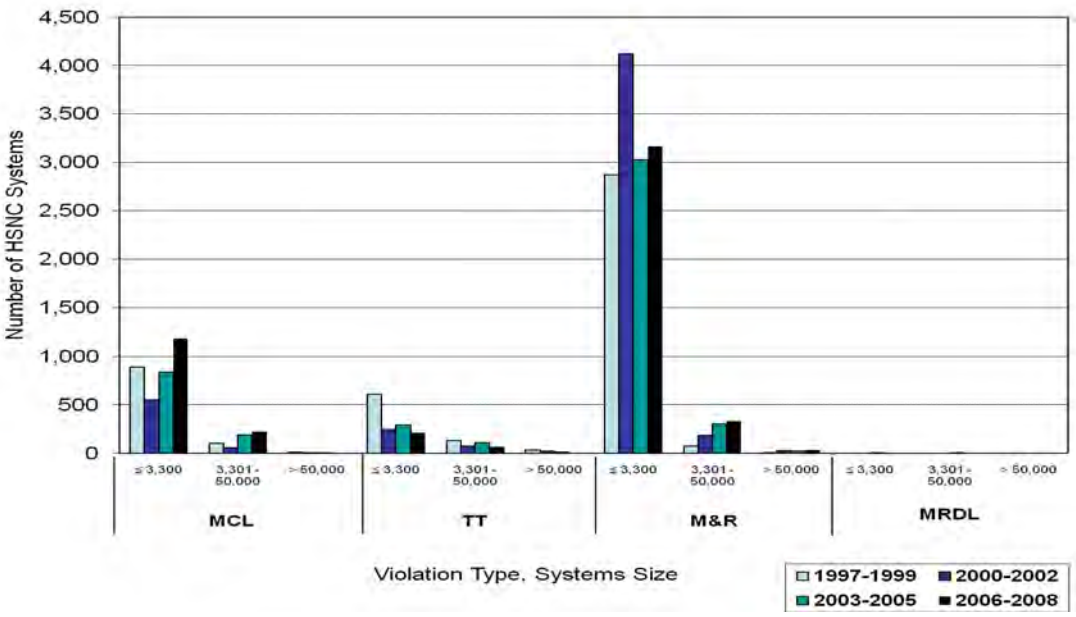
- Another reason for this increase in M&R violations could be the decrease and/or high turnover rate of certified operators at the public water systems. The data show that the number of systems that were HSNCs because they did not have a qualified operator has increased in recent years. The lack of technical knowledge at a significant number of systems could be one reason why there is an increase in M&R violations. At least one

state has reported that the number of certified operators in the state is far less than the number of systems that require a certified operator to manage the system.

- Approximately 90 percent of the HSNCs due to M&R violations continue to be small systems. This trend is evident in Exhibit 11.
- M&R presents a significant barrier in protecting public health since a missed sample does not allow the state to know the quality of the water being produced.

Exhibit 11: HSNCs by System Size and Violation, Over 4 HSNC Periods[14]

Please see Appendix B for an explanation of violation types.



- HSNCs due to MCL violations were highest in the 2006 – 2008 period. HSNCs due to MCL violations in the 2006 – 2008 period increased by approximately 35 percent (or 378 systems) over the previous period. Additionally, the number of HSNCs in the 2006 – 2008 period was more than double that of the 2000 – 2002 period (see Exhibit 10). The majority of HSNCs due to MCL violations are small systems, as shown in Exhibit 11. In each reporting period, small systems comprised over 80 percent of all MCL HSNCs.
- As shown in Exhibit 10, HSNCs due to TT violations have decreased by approximately 30 percent, or 123 systems, between the 2003 – 2005 and 2006 – 2008 periods. HSNCs due to TT violations were highest in the 1997 – 1999 period. As shown in Exhibit 11, small systems have the highest number of TT HSNCs.
- Regulations that contain TT requirements are the suite of SWTRs, LCR, and, in the future, GWR.
- As evident in Exhibit 11, MRDL violations are not a major source of HSNCs.

14 The 8 systems that changed size categories are double counted in this exhibit. See Footnote 7 for more details.

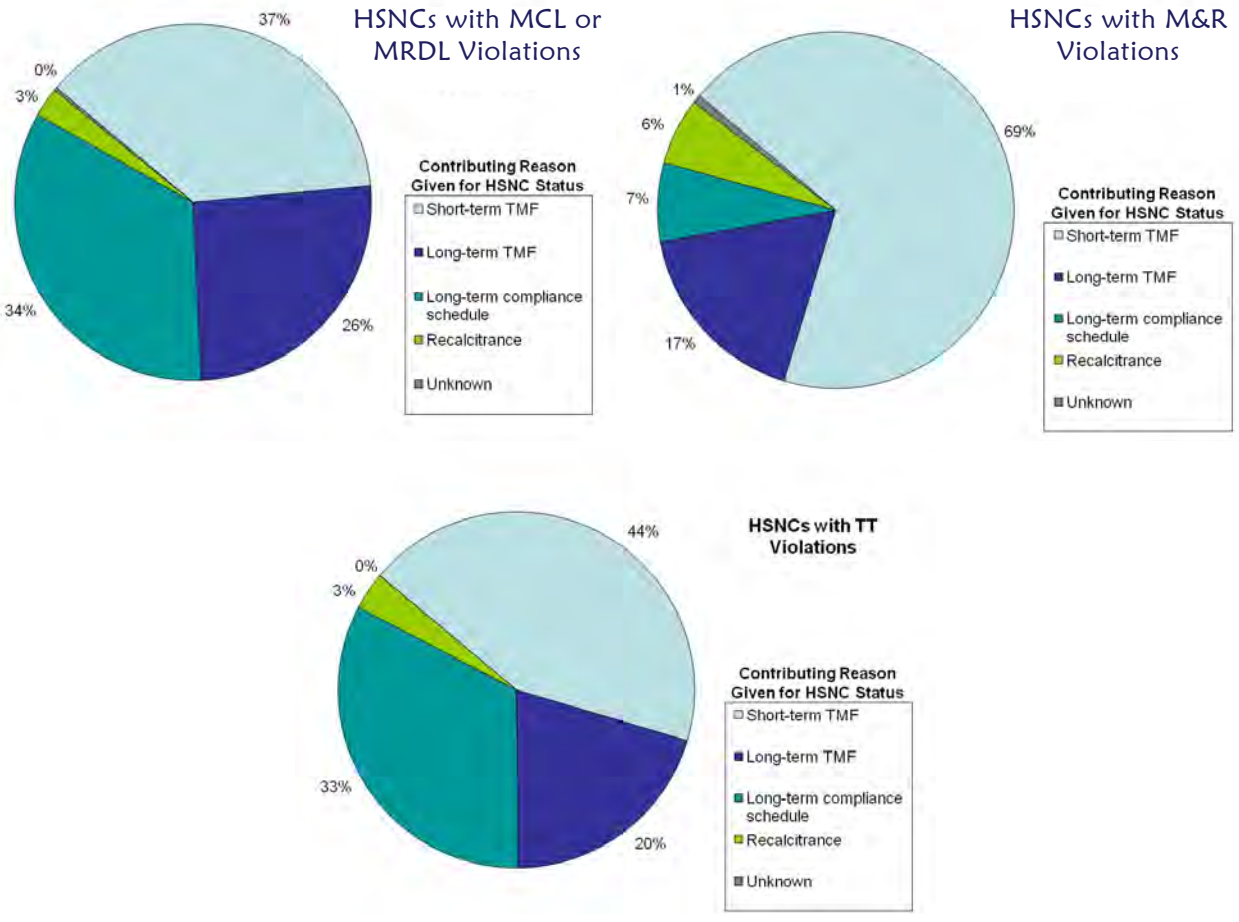
Trends in Violations Linked to Technical, Managerial & Financial Issues

As part of enforcement data collection efforts, states were asked to identify if the reason the system was an HSNC was due to the lack of technical, managerial, or financial capacity. Based on the information provided by some states, these were some of the findings the data reflected:

- When states were asked by EPA to identify the reasons for prevalence of HSNCs, they frequently noted the lack of short-term technical, managerial, or financial capacity (see Exhibit 12).[15] Short-term technical, managerial, or financial problems have been particularly common since 2004, with an increase of 45 percent from the time period 2003 – 2005 to the period 2006 – 2008. Although this increase correlates with the timing of the implementation of Stage 1 DBPR requirements for systems serving fewer than 10,000 persons, the data do not provide enough information to make a strong correlation.

Exhibit 12: HSNCs by Violation and Reason, 2006 – 2008

Please see Appendix B for an explanation of violation types and reasons for History of Significant Non-Compliance.



15 Ohio identified long-term technical, managerial, or financial capacity as a reason code for HSNC prevalence, but did not specify the exact reason associated with technical, managerial, or financial capacity.

- Other commonly cited reasons for violations include long-term technical, managerial, or financial capacity and long-term compliance schedule (particularly for MCL and TT violations). Long-term compliance schedule was noted for systems that are developing adequate technical, managerial, and financial capacity to achieve compliance and are adhering to an approved compliance schedule. Other states noted problems such as:

  - ✓ Unresolvable disinfection byproduct exceedances.
  - ✓ Consecutive system compliance issues.
  - ✓ Poor source water quality.
  - ✓ Inexperienced system operators and management.
  - ✓ Chronic failure to file CCRs.

How the State of South Carolina uses Capacity Development to Return Systems to Compliance

The South Carolina Department of Health and Environmental Control (DHEC) Capacity Development team has been actively working to support return to compliance efforts for water systems in need. Several Capacity Development success stories are noted below:

- *One system was detecting total coliform during regular sampling intervals. The system's service area is a high-growth area with significant construction, and the state's Capacity Development team determined that the system's operator was not assisting local construction crews with locating water lines, and was not operating the system's chlorination system. With the help of the South Carolina DHEC Regional staff, the team learned that line breaks occurred routinely in the system, but that repairs were made without notifying the system and subsequently, disinfection was not performed. The Capacity Development team educated the system operator on the appropriate procedures to return the system to compliance.*

- *One system continuously exceeded the MCL for the disinfection byproduct Total Trihalomethane (TTHM). The system and a team from the DHEC participated in a 2.5 year EPA pilot program with the technical support center in Cincinnati, Ohio. The study confirmed the operator's belief that the problem was not in the plant, but in the distribution system. Following the study, the operator was able to convince the system's board of the importance of a comprehensive flushing program and the need to improve the tank turnover time to stay under the MCL.*

- *Coliform bacteria were identified through monitoring at one system. The bacterial hits were found both inside the water facility and at the wellhead. In response, the Capacity Development team participated in the system's sanitary surveys and visited the owner to negotiate the connection of the system to a nearby system. The connection was finalized and the contaminated well was taken out of service.*

Conclusions

Even though the number of small systems classified as HSNCs has decreased in recent years, systems serving 3,300 and fewer people still represent the majority of the HSNCs identified across the nation. It is important to note, however, that small systems also comprise more than 90 percent of all water systems in the United States. Almost 1,500 water systems have been repeat HSNCs since 2003, with over 90 percent (or 1,314 out of 1,452 systems) serving 3,300 and fewer people. As such, these small systems clearly require additional technical, managerial, and financial assistance to prevent violations.

States have identified "short-term technical, managerial and financial issues" as the number one reason systems were classified as HSNCs. Short-term technical, managerial, or financial capacity problems usually address operation and maintenance activities such as inexperienced operators, high turnover in management and operators, funding shortfalls or unexpected expenses, inadequate sampling plans, and incomplete or lack of Consumer Confidence Reports, among other issues.

The fact that states identified short-term technical, managerial, or financial capacity as the primary reason for non-compliance highlights the importance of the state Capacity Development programs to help public water systems achieve sustainability. Currently, there are many tools and approaches to help systems attain and maintain short- and long-term capacity. Below are some programs and tools that states employ to help systems achieve compliance and become sustainable. The extent of the use of particular programs, tools, and concepts varies by state. Some of the programs and tactics that states utilize are listed below; check EPA's Web site for additional information: water.epa.gov/type/drink/pws/smallsystems/.

- State Capacity Development Programs – The focus of these programs is to assist systems to develop and maintain the technical, managerial, and financial capacity to ensure public health protection. State Capacity Development programs have been critical in addressing the small system challenges across the nation. States evaluate the capacity of new water systems to ensure non-viable systems are not added to the inventory, and continuously assess existing systems to ensure they maintain their capacity or provide the assistance needed to attain capacity.

- Drinking Water State Revolving Fund – Under this program, states use funds to provide loan assistance to public water systems for infrastructure improvements to ensure safe drinking water. The set-aside funds can provide targeted assistance to small water systems.

- Water Efficiency & Availability for Water Suppliers – Only so much freshwater is available for consumption. As a result of population growth, greater competition of resources, and early signs of climate change, drinking water suppliers will increasingly need to adopt best industry practices for water efficiency as well as new strategies that adjust for variable water quantity and quality. For more information visit water.epa.gov/infrastructure/sustain/main_wp.cfm.

- Asset Management & CUPSS – Managing assets (e.g., buildings, equipment, pipes, and operators) ensures that a system gets the most value from each of its assets, has the financial resources to rehabilitate and replace them when necessary, and can reduce

costs while increasing the efficiency and the reliability of a system. One EPA tool for asset management at small drinking water and wastewater utilities is the Check Up Program for Small Systems (CUPSS). CUPSS provides a simple, comprehensive approach based on EPA's highly successful Simple Tools for Effective Performance (STEP) Guide series. Effective asset management can address system challenges such as increasingly stringent regulatory requirements, setting appropriate rate structures, and potential system failures. Systems can use CUPSS to help develop records of assets, a schedule of required tasks, an understanding of a system's financial situation and a tailored asset management plan. For more information, visit water.epa.gov/infrastructure/drinkingwater/pws/cupss/index.cfm.

- Operator Certification Program – Recruiting, training and certifying water system operators is vital to the capacity and long-term sustainability of a water system. EPA has developed various materials on improving water system operation and developing experienced operators. For example, see *Water System Operator Roles and Responsibilities: a Best Practices Guide*. www.epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_operator_08-25-06.pdf

- Restructuring of Systems – Water systems facing continuous compliance problems should consider restructuring, which involves changes to the operational, managerial, or institutional structure of a water system. Restructuring options can range from relatively minor changes in a system's procurement processes to transferring ownership of a system through consolidation or regionalization. EPA has developed case studies on restructuring, such as: *Restructuring and Consolidation of Small Water Systems*. www.epa.gov/ogwdw000/smallsystems/pdfs/compendium_smallsystems_restruct.pdf

- Technical Assistance – In addition to states, many organizations across the country provide technical assistance to small systems. States can help identify a technical assistance provider. For help in this selection, see the EPA Partner Web site at water.epa.gov/type/drink/pws/smallsystems/partners.cfm#partners.

Appendix A – Changes to the PWSS Program Approach

EPA is implementing a new, more comprehensive approach for enforcement of the Public Water System Supervision (PWSS) Program under the SDWA. As part of this effort, a new Enforcement Response Policy (ERP) and Enforcement Targeting Tool (ETT) will be used. This system-based approach uses a tool that enables the prioritization of public water systems by assigning each violation a "weight" or number of points based on the assigned threat to public health. One goal of the ERP is for states and EPA to help water systems return to compliance.

The revised ERP and new ETT will allow EPA to maintain the consistency and reliability of the enforcement program, while increasing its effectiveness at protecting public health. The ETT will rank systems with health-based violations, while revisions to the ERP will help ensure that these systems return to compliance.

Currently, EPA uses the SNC status to target enforcement efforts. SNC status reflects a system's failure to comply with individual drinking water rules. Under the existing system, all SNCs are treated equally, without regard to the gravity of the violation and without considering other violations a system may have that are not identified as SNC.

The ETT will evaluate and rank public water systems' non-compliance across all drinking water rules. The ETT consists of a formula to rank water systems based on the severity of the violations and the number of years since the first unaddressed violation. Each violation will be assigned a value based on the threat it poses to public health. The formula will incorporate all open-ended violations and any other violations that have occurred in the past 5 years. It will not, however, include violations that have returned to compliance or that are covered under a formal enforcement action and are deemed on the "path to compliance." A formal enforcement action is defined as one which requires specific actions necessary for the violator to return to compliance, is based on a specific violation, and is independently enforceable without having to prove the original violation. The enforcement targeting formula is shown below, where S is equal to the violation severity factor, and n is the number of years for which the system's oldest violation remains unaddressed.

$$PWS\ Score\ of\ Non\text{-}compliance = Sum(S1 + S2 + S3 + ...) + n$$

The formula assigns a higher weight for acute health-based violations, where S is equal to ten points. For each other health-based and TCR repeat monitoring violation, or for each Nitrate M&R violation, S is equal to five points. Additionally, S is equal to one point for each other M&R violation, or any other violation.

By assigning each water system a score using the (ΣS) + n formula, all water systems will be ranked nationally. During the initial trial period for the ERP and ETT, any water system with a score of 11 or higher will be recognized as a priority system. The EPA and states will use concepts of escalating enforcement and timely and appropriate response to achieve a return to compliance. Under the escalating enforcement concept, the state and EPA are expected to escalate the responses to violations as they recur or increase in severity. Under the timely and appropriate response concept, states and EPA have two quarters to return a system to compliance after it is identified as a priority. If states and EPA are unable to return a system to compliance within two quarters, the ERP expects to prioritize the system under a formal enforcement action (e.g., administrative orders with or without penalties, state or federal civil case, etc) and place it "on a path to compliance." States and EPA should track the systems on

a path to compliance so that they ultimately return to compliance according to the enforceable schedule in the formal enforcement action. The new policy will ensure that timely action is taken by states to resolve violations and to achieve EPA's ultimate goal - to return systems to compliance.

Appendix A contains the information that EPA had available for when this report was written. For the most up-to-date information on this policy, see EPA's Web site at: www.epa.gov/compliance/civil/sdwa/.

Appendix B – Tables of Acronyms

The HSNC data submitted and analyzed for this report includes information on CWSs and NTNCWSs; it documents the trends of HSNCs by system size, system type, rule, violation, and reason. In particular, the following variables are included in the HSNC dataset:

Table 1: Rules and Abbreviations

Rules	Abbreviation
Total Coliform Rule	TCR
Surface Water Treatment Rule	SWTR
Interim Enhanced Surface Water Treatment Rule and Long Term 1 Enhanced Surface Water Treatment Rule	LT1/LT1IESWTR
Stage 1 Disinfectants and Disinfection Byproducts Rule	DBPR/Stage 1 DBPR
Filter Backwash Recycling Rule	FBRR
*Stage 2 Disinfectants and Disinfection Byproducts Rule**	*Stage 2 DBPR**
*Long Term 2 Enhanced Surface Water Treatment Rule**	*LT2ESWTR**
*Ground Water Rule**	*GWR**
Phase II/V Rule – Inorganic Chemicals (IOCs), Synthetic Organic Chemicals (SOCs), and Volatile Organic Chemicals (VOCs) – and Radionuclides Rule	Chem/Rad
Lead and Copper Rule	LCR
Consumer Confidence Report Rule	CCR
Public Notification Rule	PN

** Due to the compliance dates of these regulations, violations for these rules are not present in the data.*

Table 2: Definitions and Abbreviations of Reported Violations[16]

Violation	Definition	Abbreviation
Monitoring and Reporting	A water system's failure to monitor for, or report to the state, the level of a contaminant on the required schedule	M&R
Maximum Contaminant Level	The maximum permissible level of a contaminant in water which is delivered to any user of a public water system	MCL
Maximum Residual Disinfectant Level	Level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. MRDLs are enforceable in the same manner as MCLs under Section 1412 of the SDWA	MRDL
Treatment Technique	A required process intended to reduce the level of a contaminant in drinking water	TT
Other	CCR, PN, record keeping, and notification violations	Other

16 The 1997 - 2002 HSNC dataset included older violation codes, which were adjusted to match up with the newer violation codes in the 2003 – 2008 HSNC data.

Table 3: Reason for History of Significant Non-Compliance[17, 18]

Reason	Definition
Short-term technical, managerial, or financial (TMF) problem	The system was out of compliance because of a short-term problem such as an inexperienced operator, or a short-term funding shortfall due to unexpected expenses. The system has already addressed or is expected to address the problem shortly and it returned to compliance or is expected to return to compliance soon.
Long-term technical, managerial, or financial problem	The system lacked the fundamental technical, managerial, and/or financial capacity to achieve compliance. Short-term assistance for the system would not resolve the long-term compliance problem.
System was on a long-term compliance schedule to correct the problem	The system was developing adequate technical, managerial, and financial capacity to achieve compliance and was adhering to an approved compliance schedule.
Recalcitrance	System showed no interest in attempting to resolve the compliance problem.
Unknown	The reasons for the system's non-compliance are not known.

17 The following states did not submit reason codes for 2003 – 2005 data: AK, AZ, ID, IL, KY, MI, OH, OR, PA, UT, WA, and WI.

18 An additional reason code "Data Error" could be used by states. Data Error are systems that were not actually a SNC for 3 or more quarters during the period. These systems are not included in the analysis for this report.

Appendix C – HSNCs by State

The following table lists the number of HSNCs and small system HSNCs that were used to develop Exhibits 4 and 5.

Table 4: Number of HSNCs and Small System HSNCs by State

State	Number of HSNCs	Number of HSNCs that are Small Systems
Alaska	265	258
Alabama	53	37
Arkansas	66	53
Arizona	591	506
California	68	61
Colorado	167	150
Connecticut	64	56
Washington D.C.	1	0
Delaware	26	26
Florida	306	271
Georgia	61	59
Hawaii	6	4
Iowa	46	44
Idaho	87	80
Illinois	55	52
Indiana	31	26
Kansas	33	30
Kentucky	74	38
Louisiana	202	175
Massachusetts	21	12
Maryland	50	48
Maine	74	71
Michigan	67	64
Minnesota	27	25
Missouri	74	69
Mississippi	53	49
Montana	88	87
North Carolina	324	290
North Dakota	7	6
Nebraska	7	7
New Hampshire	54	52
New Jersey	65	49
New Mexico	82	78

State	Number of HSNCs	Number of HSNCs that are Small Systems
Nevada	68	61
New York	172	154
Ohio	60	54
Oklahoma	190	151
Oregon	201	182
Pennsylvania	341	316
Puerto Rico	191	161
Rhode Island	16	14
South Carolina	18	17
South Dakota	31	29
Tennessee	28	15
Texas	55	47
Utah	41	33
Virginia	76	76
Virgin Islands	35	35
Vermont	95	91
Washington	211	196
Wisconsin	33	27
West Virginia	70	58
Wyoming	15	14